CLAIMS

What is claimed is:

1. In an internal combustion engine electrostatic crankcase ventilation system, an EDC, electrostatic droplet collector, assembly having an inlet receiving gas from said engine, and an outlet discharging cleaned gas, comprising a canister mounted to a mounting head in said system, a corona discharge electrode assembly in said canister and spaced from said canister by a gap providing a corona discharge zone, said canister providing a collector electrode, said canister being removably mounted to said mounting head to permit removal and replacement of said collector electrode.

2. The EDC assembly according to claim 1 wherein said corona discharge electrode assembly is mounted to said canister and removable therewith from said mounting head.

3. The EDC assembly according to claim 1 wherein said corona discharge electrode assembly is mounted to said mounting head and remains mounted to said mounting head upon removal of said canister from said mounting head.

4. The EDC assembly according to claim 1 wherein said canister engages said mounting head in threaded engagement such that said canister is mounted to said mounting head in spin-on relation, and is removed from said mounting head in spin-off relation.

5. The EDC assembly according to claim 4 wherein said canister extends axially along an axis between first and second axial ends, said first end being closed and having said inlet, said second end being open and facing said mounting head and having threads threaded to said mounting head in said threaded engagement.

6. The EDC assembly according to claim 5 wherein said corona discharge electrode assembly comprises an electrical conductor attached to an electrical insulator having one or more apertures passing said gas axially therethrough from said canister to said mounting head.

7. The EDC assembly according to claim 6 wherein said one or more apertures are radially inward of said threads.

8. The EDC assembly according to claim 7 wherein said one or more apertures are axially aligned with said gap providing said corona discharge zone.

9. The EDC assembly according to claim 6 wherein said gas flows through said one or more apertures into a plenum in said mounting head, said plenum being radially inward of said threads.

10. The EDC assembly according to claim 9 wherein said gas flows from said inlet through a first annulus between said electrical conductor and said canister, and flows through a second annulus in said plenum, said first annulus having a larger inner diameter than said second annulus.

11. The EDC assembly according to claim 1 wherein said inlet is in said canister, said outlet is in said mounting head, and wherein said gas flows from said canister into a plenum in said mounting head then to said outlet, said mounting head having a wall defining said plenum on one side thereof and defining a space on the other side thereof having a high voltage electrode.

12. The EDC assembly according to claim 11 wherein said mounting head has a passage therein extending through said space on said other

side of said wall and passing gas therethrough from said plenum to said outlet.

13. The EDC assembly according to claim 12 comprising a second wall in said mounting head facing said first mentioned wall and separated therefrom by a gap defining said space on said other side of said first wall.

14. The EDC assembly according to claim 13 wherein said high voltage electrode is in said gap between said first and second walls, and said passage spans said gap between said first and second walls.

15. The EDC assembly according to claim 11 wherein said corona discharge electrode assembly comprises an electrical insulator having one or more apertures therethrough passing gas from said canister into said plenum.

16. A method for servicing an internal combustion engine crankcase ventilation system having an EDC, electrostatic droplet collector, comprising providing a canister removably mounted to a mounting head in said system, providing a corona discharge electrode assembly in said canister and spaced from said canister by a gap providing a corona discharge zone, said canister providing a collector electrode, removing said canister from said mounting head for removal and replacement of said collector electrode.

17. The method according to claim 16 wherein said corona discharge electrode assembly is mounted to said canister and removed therewith from said mounting head.

18. The method according to claim 16 wherein said corona

discharge electrode assembly is mounted to said mounting head and remains mounted to said mounting head upon removal of said canister from said mounting head.

19. In an internal combustion engine electrostatic crankcase ventilation system, an EDC, electrostatic droplet collector, assembly comprising a canister removably mountable to a mounting head in said system, said canister having an inlet for receiving gas from said engine, said mounting head having an outlet for discharging cleaned gas, a corona discharge electrode assembly in said canister and removable therewith as a unit from said mounting head.

20. The EDC assembly according to claim 19 wherein said canister extends axially along an axis and has an open axial end facing said mounting head, and comprising a mounting plate having a first portion attached to said canister and a second portion removably mountable to said mounting head, and an electrical insulator attached to said mounting plate, and wherein said corona discharge electrode assembly comprises an electrical conductor attached to said electrical insulator.

21. The EDC assembly according to claim 20 wherein said mounting plate comprises a nut plate having a first segment attached to said canister, said first segment also being sealed to said mounting head by an annular gasket therebetween, said nut plate having a second segment engaging said mounting head in threaded relation.

22. The EDC assembly according to claim 21 wherein said first segment of said nut plate is attached to said canister at said open axial end of said canister, and wherein said first segment of said nut plate and said open axial end of

said canister are sealed to said mounting head by said annular gasket therebetween.

23. The EDC assembly according to claim 21 wherein said nut plate has an intermediate shoulder segment extending radially inwardly from said first segment to said second segment, said first segment extends axially upwardly from said shoulder segment and supports said gasket, said second segment extends axially downwardly from said shoulder segment, said second segment having a first face facing radially inwardly and being threaded, and a second face facing radially outwardly, said electrical insulator having an outer L-shaped flange having a first leg extending axially upwardly along said second face of said second segment of said nut plate, and having a second leg extending radially inwardly from said first leg and beneath said second segment of said nut plate.

24. The EDC assembly according to claim 23 wherein said electrical insulator has one or more apertures therethrough, and said gas flows through said one or more apertures into a plenum in said plenum being radially inward of the threaded engagement of said second segment of said nut plate and said mounting head.

25. The EDC assembly according to claim 24 wherein said mounting head includes an inverted L-shaped flange having a first leg extending radially outwardly and above said first segment of said nut plate and said open axial end of said canister and sealed thereto by said gasket in axial compression, said inverted L-shaped flange having a second leg extending axially downwardly and having a first face facing radially outwardly and threadingly engaging said first face of said second segment of said nut plate, said second leg of said inverted L-shaped flange having a second face facing radially inwardly and defining said plenum.

26. The EDC assembly according to claim 25 wherein said second

leg of said inverted L-shaped flange extends axially downwardly to a lower end, said lower end being above said second leg of said L-shaped flange of said electrical insulator, said apertures extending axially through said second leg of said L-shaped flange of said electrical insulator radially inward of said second leg of said inverted L-shaped flange.

27. The EDC assembly according to claim 26 wherein gas flows from said inlet through a first annulus between said electrical conductor an said canister, said insulator comprises a disc having an outer portion with said L-shaped flange extending outwardly therefrom, and having a central portion with a columnar stalk extending axially upwardly therefrom into said plenum and spaced radially inwardly of said second leg of said inverted L-shaped flange by a second annulus therebetween defining said plenum, said second annulus having a smaller outer diameter than said first annulus.

28. The EDC assembly according to claim 27 wherein the outer diameter of said second annulus is substantially equal to the inner diameter of said first annulus.

29. A removable and replaceable EDC, electrostatic droplet collector, assembly for an internal combustion engine electrostatic crankcase ventilation system, said assembly comprising an axially extending canister having an open axial end, a mounting plate fixed to said canister and detachably mountable to a mounting head in said system, a gasket sealingly compressed between said mounting plate and said mounting head, an electrical insulator attached to said mounting plate, and a corona discharge electrode attached to said electrical insulator.

30. The EDC assembly according to claim 29 wherein said

mounting plate engages said mounting head in threaded relation at a location radially inward of said gasket.

31. The EDC assembly according to claim 30 wherein said mounting plate is fixed to said canister at said open axial end thereof, and said gasket is axially compressed between said mounting plate and said mounting head at said open axial end of said canister.

32. The EDC assembly according to claim 29 wherein said mounting plate has a first face engaging said mounting head in detachable relation, and a second distally opposite face engaging said electrical insulator in fixed relation.

33. The EDC assembly according to claim 32 wherein said first and second faces face radially in opposite directions, and wherein said mounting plate at said first and second faces is radially between said mounting head and said electrical insulator on radially distally opposite sides thereof.

34. The EDC assembly according to claim 33 wherein said mounting head has a face facing radially outwardly and engaging said first face of said mounting plate, said electrical insulator has a face facing radially inwardly and engaging said second face of said mounting plate, and wherein said face of said electrical insulator is radially outward of said face of said mounting head.

35. In an internal combustion engine electrostatic crankcase ventilation system, an EDC, electrostatic droplet collector, assembly comprising a canister removably mountable to a mounting head in said system, said canister having an inlet for receiving gas from said engine, said mounting head having an outlet for discharging cleaned gas, a corona discharge electrode assembly in said

canister and removable therewith as a unit from said mounting head, said corona discharge electrode assembly comprising an electrical insulator supporting an electrical conductor, wherein gas flows from said inlet through a first annulus between said electrical conductor and said canister, said insulator comprises a disk having a central portion with a columnar stalk extending axially upwardly therefrom into a plenum in said mounting head and defining a second annulus therebetween through which recirculation gas flows to said outlet, said second annulus having a smaller outer diameter than said first annulus.

36. The EDC assembly according to claim 35 wherein the outer diameter of said second annulus is substantially equal to the inner diameter of said first annulus.

37. In an internal combustion engine electrostatic crankcase ventilation system, an EDC, electrostatic droplet collector, assembly comprising a canister removably mountable to a mounting head in said system, said canister having an inlet for receiving gas from said engine, said mounting head having an outlet for discharging cleaned gas, a corona discharge electrode assembly in said canister and removable therewith as unit from said mounting head, wherein gas flows from said canister into a plenum in said mounting head then to said outlet, said mounting head having a wall defining said plenum on one side thereof and defining a space on the other side thereof having a high voltage electrode.

38. The EDC assembly according to claim 37 wherein said mounting head has a passage therein extending through said space on said other side of said wall and passing gas therethrough from said plenum to said outlet.

39. The EDC assembly according to claim 38 comprising a second wall in said mounting head facing said first mentioned wall and separated therefrom

by a gap defining said space on said other side of said first wall.

40. The EDC assembly according to claim 39 wherein said high voltage electrode is in said gap between said first and second walls, and said passage spans said gap between said first and second walls.

41. The EDC assembly according to claim 37 wherein said corona discharge electrode assembly comprises an electrical insulator having one or more apertures therethrough passing gas from said canister into said plenum.

42. The EDC assembly according to claim 41 wherein said insulator comprises a stalk extending through said plenum, and wherein said wall has an opening receiving said stalk extending therethrough.

43. The EDC assembly according to claim 42 wherein said wall has a second opening therethrough passing gas from said plenum to said outlet.

44. A method for servicing an internal combustion engine crankcase ventilation system having an EDC, electrostatic droplet collector, comprising providing a canister having a corona discharge electrode assembly therein, said canister and said corona discharge electrode assembly being mounted as a unit to a mounting head in said system, and removing said canister and said corona discharge electrode assembly as a unit from said mounting head for replacement.

45. The method according to claim 44, comprising:

providing said canister with a mounting plate fixed to said canister, an electrical insulator attached to said mounting plate, and a corona discharge electrical conductor attached to said electrical insulator;

said canister, said mounting plate, said insulator and said conductor being installed as a unit by detachable mounting of said mounting plate to said mounting head;

removing said canister, said mounting plate, said insulator and said conductor as a unit by detaching said mounting plate from said mounting head.

46. The method according to claim 45 comprising providing a gasket engageable between said mounting plate and said mounting head, and engaging said mounting plate and said mounting head in threaded relation at a location spaced from said gasket and axially compressing said gasket during threaded engagement of said mounting plate with said mounting head.